REMARKS

Applicants acknowledge that the outstanding Office Action has been made final, and accordingly a Request for Continued Examination and the appropriate fee have been filed concurrently herewith. Applicants therefore respectfully request that the foregoing amendment be entered, and that further examination of this application be based on the claims as amended herewith.

Claims 1, 3-9, 11, 14-20 have been rejected under 35 USC §102(e) as being anticipated by Matsumaru et al (U.S. Patent No. 5,818,673); while Claims 2, 10, 12, 13, 21-25 have been rejected under 35 USC §103(a) as being unpatentable over Matsumaru et al (U.S. Patent No. 5,818,673).

In the following remarks, each of the independent claims remaining in this application is addressed separately.

A comparison of amended Claim 1 with the Matsumaru et al reference shows that the short circuit sensor arrangement in Matsumaru et al differs fundamentally from that of the present invention. That is, the short sensor according to the invention as defined in Claim 1 is configured to predict short circuits of the electric power line between the connecting points, between the respective control modules and the electric power lines, and plural portions of the connector portions. (See elements 17A-17D). In particular, in the invention, in

the respective sections of the electric power line between the connecting points, between the respective control modules and the electric power lines, and plural portions of the connector portions (17A-17D), the outer peripheries of the electric power lines are covered by sensor electric lines, to which a predetermined potential is applied. Based on the potential of these covering lines, short circuit abnormalities of the electric power lines in the respective sections are predicted. That is, before the electric power line actually experiences a short, the section of the electric power line in which the short is imminent is specified, and it is possible to separate only the specific electric power line section which exhibits the possibility of incurring a short circuit.

On the other hand, in the electric power distribution system with a fault bypass feature as disclosed in Matsumaru et al, at the branching point of the electric power lines, the current flowing to the respective branches is detected, and it is determined whether or not the branch is shorted. However, when any one of the plural branching lines is short circuited, the same eddy current flows into the all of the branching lines, and causing all of the eddy current detectors to operate. As a result, it is impossible to distinguish exactly which branching line may cause the short.

According to the invention, the latter difficulty is eliminated. Further, Matsumaru et al does not recognize or utilize the basic concept of dividing the

electric power lines into a load driving electric power line and a control circuit power line.

Independent Claim 3 as amended recites that the electric power supply line to the control circuit and the electric power supply line to the load are connected through separate fuses from the battery, such that even when a short circuit occurs in the electric power supply to the load, the electric power supply to the control circuit is unaffected, thereby maintaining necessary functions.

On the other hand, in Matsumaru et al electric power is supplied from the electric power source line 55 to the control circuit (CPU portion 63) and to the load (the branch line 54); and when the electric power source line 55 is short circuited, the electric power supply to both the load (the branch line 54) and the control circuit (CPU portion 63) is interrupted. Therefore, during the short, even when the control circuit itself is normal, it is impossible to perform other necessary functions.

In the invention defined in Claim 7 as amended, the first electric power supply line to the load and the second electric power supply line to the control circuit are connected through separate fuses from the battery. A short of the first electric power supply line to the control circuit portion is detected, and the first electric power line is protected. Thus, when such a short occurs in the first

electric power line, it is assured that protection controlling functions to the first electric power line are performed.

In Matsumaru et al, on the other hand, electric power is supplied from the electric power source line 55 to the control circuit (CPU portion 63) and to the load (the branch line 54); and when the electric power source line 55 is caused to short circuit, the electric power supply to both the load (branch line 54), the control circuit is interrupted. Accordingly, during continuation of the short even if the control circuit (which receives the effects of the short) is itself normal, it is impossible to perform the other functions. Furthermore, the feature of Claim 7 that the electric power line is divided into the load driving electric power line and the control circuit driving electric power line is not disclosed.

Claim 8 recites that the first electric power supply line for the running control load of the vehicle, the second electric power supply line for the installation system load, and the third electric power line which supplies the control circuit that controls the running control load of the vehicle and the installation system load are connected at the inner portion of the vehicle through a separate fuse. With this arrangement, even when an abnormality occurs in the first and second electric power supply lines, the functions of the control circuit are maintained.

In Matsumaru et al, however, as noted previously, electric power is supplied from the electric power source line 55 to the control circuit (CPU portion 63) and to the load (the branch line 54); and when the electric power source line 55 is caused to short circuit, the electric power supply to both the load (the branch line54) and the control circuit (CPU portion 63) is interrupted. Therefore, even if the control circuit itself is normal, it is impossible to perform the other functions. Moreover, as noted previously, Matsumaru et al fails to teach or suggest that the electric power line is divided into the load driving electric power line and the control circuit driving electric power line.

In Claim 9 as amended, the fuse and the shutdown circuit are connected electrically in series between the battery and the load. The control circuit is coupled to receive electric power from the battery via another electric power line, through a separate fuse. Thus, the shutdown circuit and the driver circuit are controlled according to the control circuit. Moreover, even when an abnormality occurs in the electric power line between the shutdown circuit and the load, operation of the control circuit is assured. Additionally, when the fuse of the electric power supply electric power line to the load is opened, the functions of the control circuit are maintained. In contrast to this arrangement, in Matsumaru et al electric power is supplied from the electric power source line 55 to the control circuit (CPU portion 63) and to the load (the branch line 54); and when the electric power source line 55 is short circuited, the electric power

supply is interrupted to both the load (branch line 54) and the control circuit (CPU portion 63), with the results as described previously.

In Claim 10 as amended, the first electric power line, which supplies electric power to the load driving circuit of the plural control modules, is connected at the interior of the vehicle through the first fuse and to the control circuit. The latter is provided inside the module and sends the control signal to the load driving circuit. The electric power line, which is thinner than the other, supplies electric power through a second fuse. Since the electric power line is divided into the two systems (the load driving electric power supply electric power line and the control circuit driving electric power supply line), even when an abnormality occurs in the load driving electric power supply electric power line, the control circuit maintains operation of the other functions. Moreover, the total weight of the electric power line is reduced.

On the other hand, in Matsumaru et al, electric power is supplied to the control circuit (CPU portion 63) and to the load (branch line 54); and when the electric power source line 55 is short circuited, the electric power supply is interrupted to both the load (branch line 54) and the control circuit (CPU portion 63), with the results described previously. Furthermore, the electric power line is not divided into the load driving electric power line and the control circuit driving electric power line, as in the present invention.

Claim 11 is directed to the load control module shown in Figure 10, which includes a communication circuit, a control circuit for outputting a load control signal in accordance with an input signal received from the communication circuit, a driving circuit for adjusting the supply of electric power to the load in accordance with the control signal from the control circuit, a relay provided in the electric power supply line to a particular load, and a fuse connected electrically between the electric power line and a particular load. This arrangement provides a load control module having a high added value; and a protection function is realized. In Matsumaru et al, on the other hand, the control module includes neither a relay on the electric power supply line to a particular load nor a fuse connected electrically between the electric power line and the specific load. The current, which flows to the branch line (54) connected to the electric power line (56) and the load, is monitored by the current sensors (67, 68a-68e, 69a-69c) and the circuit is shutdown and controlled by the supply switching control units (71, 72, 73). Thus, the feature of the load control module according to the invention, in which the double system is protected by connecting the relay and the fuse to the particular load, is not included.

Amended Claim 13 recites that the load control circuit is connected to the electric power line (which is applied and cutoff by the ignition switch) through the fuse and the second control means. Electric power, supplied upstream of the ignition switch, is provided through a separate fuse, and backup electric power is supplied to the load control means from the second control means. Thus, a

double system electric power line is provided for the load having a high importance. In other words, even when it is impossible to control the load, it is possible to operate the control circuit of the load control means. Furthermore, data showing the operation condition of the load and the load control means are stored, and the communication function to the other control means is maintained.

Further, even during the off condition of the ignition switch, the load control means is controlled. In contrast, for the load for which the control is unnecessary, the shutdown circuit of the load control means is shutdown by the control circuit.

In Matsumaru et al, backup electric power is not provided, and as a result, Matsumaru et al differs fundamentally from the invention defined in the amended Claim 13.

In Claim 14, a single load control means includes at least two driver circuits, any of which may include the circuit shutdown means. The driver circuit for controlling the load having a large current capacity is provided with a double protection system, while the driver circuit for controlling the load having a small current capacity has a single protection system. As a result, the cost of the load control means for controlling the plurality of the loads is reduced. Moreover, even when the shutdown circuit is operated, interrupting the electric

power supply to a particular load which is controlled by the first driver circuit, the second drive circuit makes it possible, for example, to apply electric power to the alarm lamp and the alarm buzzer. (See Figures 7, 8, 11 and 13, etc.) On the other hand, Matsumaru et al is silent with respect to the notion of selecting the protection system in accordance with the load to be controlled.

In Claim 18 as amended, by closing the ignition switch or the accessory switch, electric power is applied to the load driving circuit having the electric power distributing function, via the relay. This eliminates the need for a branch electric line which is divided downstream of the ignition switch or the accessory switch through a plurality of the fuses as shown in the prior art. Accordingly, it is possible to obtain a lighter weight structure of the wiring and to improve the operation.

Matsumaru et al is silent regarding the mutual relationship of the electric connection box of the ignition switch or the accessory switch. Moreover, the technique relating to the electric power distribution of the electric power to the load driving means having the electric power distributing function through the relay which is applied by closing the ignition switch or the accessory switch is neither recognized nor suggested.

Claim 21 as amended recites that the signal from the central control unit, which detects the opening and closing of the ignition switch, is received

according to the communication circuit of the front control unit, and the ignition relay connected to the front control unit is controlled in accordance with the received signal. Thus, for example, the electric power supply to an ABS (anti-braking system) or PCM (power control module) is effectively controlled. The electric power line is connected through a small number of the fuses arranged upstream or downstream of the ignition relay; electric power load of the unit connected to the ignition switch is reduced; and the electric power line from the ignition relay is shorten, so that the overall length of the electric power line is reduced.

In Matsumaru et al, the unit (48) itself, which has detected the opening and closing of the switch according to the switch signal detecting portion (61), controls the supply switch control portion (71, 72, 73), and the electric power supply to the specific electric load is controlled. That is, when opening or closing of the ignition relay is detected by the unit (48), since the latter controls the ignition relay, electric power is supplied to the specific load which is remote from the unit (48).

In the electric power distribution system according to Matsumaru et al, there is the problem that the electric power wiring to the load by which electric power is supplied through the ignition relay, becomes quite long. In addition, the electric power load on the unit (48) increases, the electric power source becomes bold, and heating of the driver circuit increases. Moreover, Matsumaru

et al provides a fuse-less system; in the case of the line such as the ignition relay to which the large electric power is supplied, since the provision of a semiconductor switching element instead of a fuse requires a large capacity, the realization is inadequate.

On the other hand, according to the invention defined in independent Claim 21, since the fusible links, which have historically given satisfactory results, are provided upstream and downstream of the ignition relay, the line having the large electric power capacity is protected; there is no problem in the realization of the system; and the total cost is reduced.

Furthermore, since the ignition relay is controlled by a separate unit, concentration of the electric power load is reversed, and the entire electric wire can be both thin and short.

The system defined in Claim 25 includes a sleep control circuit for outputting a control signal by detecting when the automobile is not operated and when the particular load of the automobile does not require electric power. The relay intervenes in the electric power line between the battery of the automobile and the driver circuit of the specific load. According to the output signal of the sleep control circuit the relay is opened, and then the driver circuit is made to sleep completely.

On the other hand, in the prior art, such as the electric power distribution system in Matsumaru et al, to obtain a sleep condition, the control signal for the driver is stopped, as is the electric power supply to the load. Moreover, the battery voltage is no more than to be applied to the electric power source terminal of the electric power control semiconductor element of the driver circuit, even when the signal to the control signal terminal of the electric power control semiconductor element is interrupted, and current continues to flow to the semiconductor joining portion. In this case, the number of the electric power controlling semiconductor elements is large (for example, from 50 to 100), and the electric power consumption from the battery is increased.

On the other hand, according to the invention defined in Claim 25, to prevent the unnecessary depletion of the battery, the electric power line to the driver circuit is shut down and the current of the electric power control semiconductor element is cut off.

The well-known technique referred to in the Office Action is the technique in which a control circuit (a microprocessor) for sending the control signal to the driver circuit is made to enter a sleep mode; but when the control circuit enters the sleep mode, the current itself of the electric power control semiconductor element is not cut off. Accordingly, the well-known technique referred to in the Office Action differs from the invention defined in independent Claim 25.

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #381NP/47981).

Respectfully submitted,

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